



How do gender and military sexual trauma impact PTSD symptoms in cognitive processing therapy and prolonged exposure?

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ABSTRACT

Objective: Effectiveness of evidence-based psychotherapy (EBP) for PTSD can vary based on gender and trauma type, with poorer outcomes for men and sexual traumas. Among veterans receiving EBPs for PTSD, the effects of the interaction between gender and military sexual trauma (MST) on treatment outcome are unclear. This study examined how gender and MST impact PTSD symptoms following cognitive processing therapy (CPT) and prolonged exposure (PE).

Method: We conducted a national, retrospective cohort study of all post 9/11 veterans who had a PTSD diagnosis from 10/2001–9/2017 at VHA facilities and >1 psychotherapy visit. Inclusion criteria included completion of ≥8 CPT/PE sessions and pre- and post-treatment PCL (N = 9711). Mixed-effects linear regression models were conducted, separately by treatment, to examine associations between changes in PTSD symptoms and gender, MST, and their interactions with time.

Results: For both treatments, there were no significant differences in pre-treatment PCL by gender or MST, and PCL decreased significantly over time. In adjusted models, only the gender by time interaction on pre-to-post-CPT change was significant ($p < .001$); the decrease in women's PCL was 2.67 points greater, compared to men.

Conclusions: Women veterans demonstrated greater reductions in PTSD symptoms from CPT. There were no differences by gender for PE, suggesting men and women veterans benefit similarly. Results suggest outcomes may be impacted by gender socialization when utilizing certain cognitive behavioral techniques. MST, regardless of gender, did not impact PTSD outcomes for either treatment. Both CPT and PE may thus be effective for veterans irrespective of MST history.

1. Introduction

Posttraumatic stress disorder (PTSD) is a debilitating mental disorder that affects approximately 23% of Operation Enduring Freedom (OEF), Iraqi Freedom (OIF), New Dawn (OND) veterans (Fulton et al., 2015). Clinical practice guidelines recommend targeting PTSD using first-line interventions, including Prolonged Exposure (PE) and Cognitive Processing Therapy (CPT; U.S. Department of Veterans Affairs and Department of Defense, 2010; Karlin et al., 2010) and there is evidence for their efficacy compared to waitlist and treatment as usual in veterans (see review, Steenkamp et al., 2015; see meta-regression, Haagen, et al.,

2015). However, despite their efficacy, veterans demonstrate poorer treatment outcomes from these evidence-based psychotherapies (EBPs) than civilian populations (Straud et al., 2019; Watts et al., 2013) and as many as 50% of veterans do not experience clinically meaningful improvements (e.g., Steenkamp et al., 2015). One reason for this may be exposure to unique trauma types, such as military sexual trauma (MST), which is associated with more severe PTSD than other trauma types, including combat (Sexton et al., 2017) and civilian sexual trauma (Himmelfarb et al., 2006; Suris et al., 2007) and may have different treatment outcomes and trajectories (Holliday et al., 2020; Lofgreen et al., 2020; Sripada et al., 2019).

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MST is defined as "... physical assault of a sexual nature, battery of a sexual nature, or sexual harassment that occurred while the individual was in the military, regardless of geographic location of the trauma, gender of the victim, or the relationship to the perpetrator" (Department of Veterans Affairs, 2004; 38 USC §1720D, 2011). MST is associated with a fourfold risk for PTSD (Surís et al., 2004) and higher likelihood of disability (Parnell et al., 2018). MST survivors can also experience complicated interactions with power and control systems when attempting to report MST (Frankfurt et al., 2018; Jordan et al., 2017; Monteith et al., 2016), higher rates of other interpersonal trauma than combat veterans (Lofgreen et al., 2020), and greater challenges with emotion regulation (Lofgreen et al., 2020), all of which may impact treatment outcomes. Research on prevalence rates for MST vary, with ranges from 22 to 71% for women veterans and 2% for men (Hoyt et al., 2011; Wilson, 2016). Prevalence rates also vary when assessing only assault compared to only harassment (e.g., 13.9% versus 31.2%; see Wilson, 2016). Although rates of MST are significantly lower in men, because the majority of Veterans Health Administration (VHA) users are men, a prevalence rate of 1–2% results in a cohort size comparable to the women MST population (Kimerling et al., 2007). Despite this, the majority of research on sequelae and treatment of MST has focused on women samples and, men who experienced MST have generally not received the same level of support as women (Leskela et al., 2001). Men who experience MST can react differently than women, reporting greater stigma and shame (Morris et al., 2014; Turchik et al., 2012), it is therefore prudent to further study the effectiveness of these EBPs for PTSD in veterans who experienced MST across both genders (Mullen et al., 2014).

To date, there have been several studies investigating the efficacy or effectiveness of EBP for PTSD in veterans with a history of MST. Five studies examined CPT and found it to be effective in reducing PTSD symptoms, both in uncontrolled trials and compared to an active control (Surís et al., 2013; Voelkel et al., 2015; Walter et al., 2014a,b; Zalta et al., 2018; Zappert and Westrup, 2008). Three studies compared outcomes stratified by history of MST and their findings provide preliminary evidence that CPT (Voelkel et al., 2015) and PE (Eftekhari et al., 2013; Schnurr et al., 2007) are similarly efficacious for veterans with and without MST. However, almost all of these EBP studies used either primarily women samples (e.g., N of men = 9) or solely women samples. Thus, there remains a paucity of research on the efficacy of these EBPs for men who experienced MST, an often understudied, but substantial population (Mullen et al., 2014).

To date, only two studies have examined gender differences in effectiveness of EBP for PTSD in veterans with a history of MST (Tiet

et al., 2015; Voelkel et al., 2015) and neither found changes in PTSD symptoms to vary by history of MST, regardless of gender. However, both studies found differences in treatment effectiveness by gender, with men demonstrating smaller decreases in PTSD symptom than women veterans following CPT and PE, suggesting that gender may be an effect modifier. Despite significant methodological heterogeneity, research on gender differences in veterans suggests PTSD treatments are generally more effective for women than men (Eftekhari et al., 2013; Shiner et al., 2019; Watts et al., 2013). However, the strength of this gender effect for specific EBPs (i.e., CPT, PE) is unclear. Notably, the two MST studies examining gender differences were conducted in residential and combined domiciliary and intensive treatment programs as were four out of the five previously discussed CPT studies, and so it also remains unclear whether these findings generalize to outpatient settings (e.g., Stürmer et al., 2005; Walter et al., 2014a,b).

In the current study, we sought to examine how gender and MST impact evidence-based psychotherapy effectiveness for PTSD in veterans in real world clinical settings. Since both CPT and PE have demonstrated measurable efficacy for PTSD in veterans (e.g., Foa et al., 2018; Monson et al., 2006; Schnurr et al., 2007), we hypothesized PTSD symptoms would decrease significantly from pre-to-post treatment for both EBPs. In line with the three other studies to date, we hypothesized that veterans who experienced MST would not significantly differ in PTSD outcomes compared to those who have not experienced MST across both treatments. Consistent with prior research, we also expected women veterans would demonstrate significantly greater reductions in PTSD from both CPT and PE compared to men. Finally, we hypothesized women who experienced MST would have significantly larger reductions from both CPT and PE than men.

2. Method

2.1. Study cohort

We conducted a national, retrospective cohort study of post 9/11 veterans. Participants were identified from the VA Corporate Data Warehouse (CDW) of 308,556 Iraq and Afghanistan war veterans who had a post-deployment PTSD diagnosis from October 2001 to September 2017 at one of 1250 VHA facilities (130 parent station identifiers). PTSD diagnoses were identified from the VA CDW using International Classification of Diseases codes. For inclusion, participants were required to have PTSD codes at two or more outpatient encounters or one inpatient encounter, or one encounter with a fee for service provider. There were 24,039 veterans who completed an EBP for PTSD (see below for more details on identification), defined in the current study as receiving eight or more EBP for PTSD sessions during any 24-week period (i.e., at least eight sessions completed within six months following first session). Within this completor sample, 19,067 completed CPT and 5154 completed PE. Given the primary aim of the current study was to examine differences in effectiveness, participants were excluded from analysis if they did not have a pre-treatment PCL within one year prior to their first therapy session and a post-treatment PCL no later than three months of their final session. Participants were also excluded if they received a mixture of PE and CPT. Therefore, the final sample used for analysis consisted of 7523 CPT completors and 2188 PE completors. The study was approved by the VA Medical Center Human Research Protection Program at a Northern California Veterans Healthcare System and Institutional Review Board at the University of California.

2.2. Data sources and measures

2.2.1. Data sources

Demographic (e.g., race, age, ethnicity, education), military sexual trauma history, encounter, PTSD symptom, and diagnostic data were obtained from the VA CDW, a national repository of VHA clinical and administrative data (Fihn et al., 2014). VHA screens all veterans

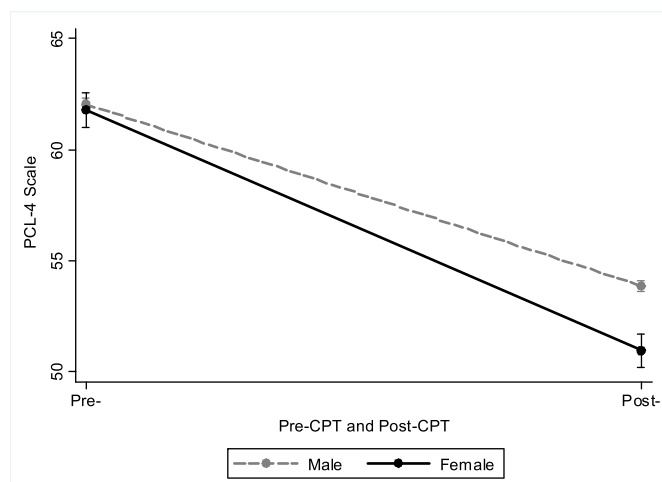


Fig. 1. $p < .01$. Significant two-way interaction of gender and time in cognitive processing therapy (CPT) completors.

presenting for care for a history of MST using clinical reminders in the electronic medical record. Veterans are asked about sexual harassment, assault, and battery and a positive response on either question results in a positive MST screen; this is the variable used in the current study. This screening method has been validated against clinical interview and demonstrates strong psychometric properties (McIntyre et al., 1999). Military service characteristics (e.g., number of deployments, service branch) were obtained from the Iraq and Afghanistan War Veterans Roster (Kang and Hyams, 2005).

2.2.2. Posttraumatic Stress Disorder Checklist

The Posttraumatic Stress Disorder Checklist (PCL) is a well-validated, widely utilized self-report measure for assessing PTSD symptoms. PCL data were collected through the CDW as well as using natural language processing (NLP) to identify psychotherapy sessions (encounters with psychotherapy administrative codes) and extract PCL scores embedded in the psychotherapy notes. Using NLP, machine-learning algorithms classified clinical note text with 92% overall classification accuracy, including 97% accuracy for CPT sessions and 99% accuracy for PE sessions (see Maguen et al., 2018 for full detail of algorithms). The NLP algorithm for PCL extraction achieved 98% precision.

During the study period (10/2001-09/2017), both the PCL-IV (Weathers et al., 1993) and PCL-5 (Blevins et al., 2015) were used for patients within the sample. The PCL-IV is a 17-item scale that assesses PTSD symptoms based on DSM-IV diagnostic criteria with items rated on a 1–5 Likert scale whereas the PCL-5 is a 20-item scale that assesses symptoms based on DSM-5 criteria with items rated on a 0–4 Likert scale. Both measures have demonstrated strong psychometric properties (e.g., Blanchard et al., 1996; Bovin et al., 2015; Wortmann et al., 2016). Because both PCL versions were used, PCL scores were transformed into z-scores. Given the PCL-IV was the more frequently used scale, z-scores were then back-transformed to PCL-IV scores (Holder et al., In Press; Maguen et al., 2020). PTSD clinical cut-off score recommendations for veterans using the PCL-IV range from 36 to 50 (e.g., Norris and Hamblen, 2003; Yeager et al., 2007).

2.3. Statistical analyses

Preliminary analyses were conducted to determine descriptive statistics and frequencies for demographic and military variables. Invalid PCL scores (PCL-IV, < 17 or > 85; PCL-5, < 0 or > 80) were excluded from analyses (i.e., 106 CPT and 34 PE PCLs). As expected within a PTSD-treatment seeking sample, PCL scores were positively skewed and had positive kurtosis in both CPT and PE cohorts. We performed Mann-Whitney tests to determine differences in PTSD symptoms between genders and MST history, respectively before and after treatment.

After individually testing bivariate associations between each potential demographic and military covariate and the outcome (PCL score), we included covariates with relatively stronger associations ($p < .01$ for both CPT and PE) in the regressions. Given their less restrictive assumptions about variance and covariance and ability to model change over time (Hedeker and Gibbons, 2006), we conducted two separate (CPT, PE) repeated measures mixed-effects linear regressions with PCL-IV score as the outcome. In the regression models, we added respectively two and three-way interaction terms between time (pre-post treatment), gender (dummy coded, women = 0, men = 1), and MST history (dummy coded, no MST = 0, MST = 1). All analyses were conducted using SAS version 9.4 (SAS Institute, 2013) and STATA version 15.0 (StataCorp, 2017).

3. Results

3.1. Preliminary analyses

As shown in Table 1, sample characteristics were largely similar

between the two treatment completer cohorts (CPT, $N = 7523$; PE, $N = 2188$). The majority of participants identified as men, White, and reported serving in the Army. Combat exposure prevalence was similar in both treatment cohorts (27–28%). Prevalence rates of MST were also fairly similar, 10% endorsed MST (73% women, 27% men) in the CPT cohort and 8% endorsed MST (69% women, 31% men) in the PE cohort.

In CPT completers, Mann-Whitney tests revealed no differences in pre-treatment PCL by gender or MST history (see Table 2), although the gender effect approached significance. However, post-treatment PCL did differ significantly by gender and MST, with women and veterans with MST histories endorsing lower symptoms than men and veterans without MST, respectively. In PE completers, Mann-Whitney tests also revealed no differences in pre-treatment PCL by gender or MST history (see Table 2), although the MST effect approached significance. However, post-treatment PCL did differ significantly by gender, with women endorsing lower symptoms than men. The effect of MST approached significance, with MST-negative veterans reporting greater symptoms than MST-positive after PE.

3.2. Primary analyses

In the CPT completer cohort,¹ mixed-effects linear regressions revealed significant effects for time ($p < .001$) and the gender by time interaction ($p < .001$; see Table 2 and Fig. 1). After at least 8 sessions of CPT, veterans endorsed a decrease in PCL scores by 8.22 points on average (95% CI, 7.88–8.56). The decrease in PCL scores from pre-to-post CPT for women veterans was 2.67 points greater than men (95% CI, 1.48–3.86). The main effects of gender and MST history as well as the MST by time interaction were not significant. These results were consistent in the three-way model (see Table 3) and the gender by MST by time interaction was not significant (see Table 4).

For the PE completer regressions, we used a less stringent statistical significance level ($p < .05$) to account for the differences in sample size compared to the CPT completer cohort. In the PE completer cohort,² mixed-effects linear regressions revealed that the only significant effect was time ($p < .001$; see Tables 2 and 3). After at least 8 sessions of PE, veterans endorsed a decrease in PCL scores by 11.26 points on average (95% CI, 10.61–11.90). The main effects of gender and MST history, and all two and three-way interactions were not significant.

3.3. Sensitivity analyses

Given the lack of significance for the three-way interaction, post-hoc sensitivity analyses were conducted to examine the pattern of gender within each MST cohort. The primary analyses examining CPT and PE outcomes were repeated adjusting for significant demographic and military variables, separately in the MST-positive and MST-negative samples. In the MST-positive cohorts, there was a significant effect of time for both treatments, with PCL scores reducing on average by 7.63 points after CPT ($p < .001$, [95% CI, 5.55–9.72]) and 10.39 points after PE ($p < .001$, [95% CI, 6.39–14.38]). The only other significant effect for either treatment was the gender by time interaction within the CPT

¹ Intent to treat (ITT) analysis for CPT cohort ($N = 16,094$) revealed only the main effect of time and gender by time interaction were significant ($ps < .001$). The decrease in PCL pre-to-post CPT was 1.70 points greater in women than men (95% CI, 1.08–2.32). Results were also unchanged when regressions were repeated with only those who completed individual CPT ($N = 4458$), excluding those who completed either group CPT ($N = 2401$) or a combination of two ($N = 664$); only the main effect of time and gender by time interaction were significant ($ps < .001$). PCL scores decreased on average by 9.91 points after CPT and the decrease in PCL pre-to-post CPT was 2.95 points greater in women than men (95% CI, 1.22–4.69).

² ITT analysis for PE cohort ($N = 6525$) revealed only the main effect of time was significant ($p < .001$).

Table 1
Baseline psychiatric and military stressor variables across sample and treatment groups.

	All EBP Completers (n = 9711)	CPT Completers (n = 7523)	PE Completers (n = 2188)	P
Baseline Age in Years M(SD)	36.7 (9.0) Range: 20-74	36.6 (9.0) Range: 20-74	36.8 (9.0) Range: 21-68	0.322
Gender				<0.001*
Male	8562 (88.2%)	6579 (87.5%)	1983 (90.6%)	
Female	1149 (11.8%)	944 (12.5%)	205 (9.4%)	
Race				0.313
White	6922 (71.3%)	5378 (71.5%)	1544 (70.6%)	
Black	1702 (17.5%)	1318 (17.5%)	384 (17.6%)	
American Indian/ Alaska native	124 (1.3%)	101 (1.3%)	23 (1.1%)	
Asian	202 (2.1%)	149 (2.0%)	53 (2.4%)	
Native Hawaiian/ Pacific Islander	121 (1.3%)	99 (1.3%)	22 (1.0%)	
Multi-race	129 (1.3%)	97 (1.3%)	32 (1.5%)	
Missing	511 (5.3%)	381 (5.1%)	130 (5.9%)	
Ethnicity				0.136
Hispanic/ Latinx	1274 (13.1%)	965 (12.8%)	309 (14.1%)	
Not Hispanic/ Latinx	8035 (82.7%)	6236 (82.9%)	1799 (82.2%)	
Other	267 (2.8%)	219 (2.9%)	48 (2.2%)	
Missing	135 (1.4%)	103 (1.4%)	32 (1.5%)	
Marital status				0.115
Married	5172 (53.3%)	3957 (52.6%)	1215 (55.5%)	
Never married	2224 (22.9%)	1761 (23.4%)	463 (21.2%)	
Divorced or single	2154 (22.2%)	1683 (22.4%)	471 (21.5%)	
Widowed	22 (0.2%)	16 (0.2%)	6 (0.3%)	
Missing	139 (1.4%)	106 (1.4%)	33 (1.5%)	
Education				0.658
<HS diploma	88 (0.9%)	70 (0.9%)	18 (0.8%)	
HS diploma	642 (6.6%)	6045 (80.4%)	1769 (80.9%)	
Some college	7814 (80.5%)	689 (9.2%)	186 (8.5%)	
BA/BS	172 (1.8%)	497 (6.6%)	145 (6.6%)	
Post BA/BS	875 (9.0%)	126 (1.7%)	46 (2.1%)	
Missing	120 (1.2%)	96 (1.3%)	24 (1.1%)	
Service branch				0.241
Air force	621 (6.4%)	486 (6.5%)	135 (6.2%)	
Army	6812 (70.2%)	5307 (70.5%)	1505 (68.8%)	
Coast guard	0 (0%)	0 (0%)	0 (0%)	
Marine	1567 (16.1%)	1186 (15.8%)	381 (17.4%)	
Navy	711 (7.3%)	544 (7.2%)	167 (7.6%)	
Component				0.969
Active duty	6263 (64.5%)	4852 (64.5%)	1,411 (64.5%)	
Guard	2161 (22.3%)	1677 (22.3%)	484 (22.1%)	
Reserve	1287 (13.3%)	994 (13.2%)	293 (13.4%)	
Rank				0.387
Enlisted	9197 (94.7%)	7119 (94.6%)	2078 (95.0%)	
Officer	460 (4.7%)	358 (4.8%)	102 (4.7%)	
Warrant	54 (0.6%)	46 (0.6%)	8 (0.4%)	
Times Deployed				0.053
Single	4965 (51.1%)	3879 (51.6%)	1086 (49.6%)	
Multiple	4703 (48.4%)	3606 (47.9%)	1097 (50.1%)	
Missing	43 (0.4%)	38 (0.5%)	5 (0.2%)	
Military sexual trauma	903 (9.3%)	731 (9.7%)	172 (7.9%)	0.009*
Rurality				0.148
Urban	6561 (67.6%)	5050 (67.1%)	1511 (69.1%)	
Rural	3036 (31.3%)	2377 (31.6%)	659 (30.1%)	
Highly rural	80 (0.8%)	66 (0.9%)	14 (0.6%)	
Missing	34 (0.4%)	30 (0.4%)	4 (0.2%)	
Service connected	9476 (97.6%)	7332 (97.5%)	2144 (98.0%)	0.157
Combat exposure				0.135
No	4211 (43.4%)	3303 (43.9%)	908 (41.5%)	
Yes	2660 (27.4%)	2040 (27.1%)	620 (28.3%)	
Missing	2840 (29.3%)	2180 (29.0%)	660 (30.2%)	

Note. * $p < .01$. EBP = evidence-based psychotherapy. CPT = Cognitive Processing Therapy. PE = Prolonged Exposure.

Table 2
Mann-Whitney U-tests examining PTSD severity pre- and post-treatment by gender and MST.

	Males M (SD)	Females M (SD)	p	MST M (SD)	No MST M (SD)	p
<i>Cognitive Processing Therapy</i>						
Pre-PCL	62.1 (11.7)	61.3 (11.9)	.06	61.4 (12.0)	62.1 (11.7)	.13
Post-PCL	53.9 (15.7)	50.5 (16.3)	.00	51.4 (16.6)	53.7 (15.7)	.00
<i>Prolonged Exposure</i>						
Pre-PE	62.3 (11.7)	60.9 (12.6)	.23	60.4 (12.5)	62.3 (11.7)	.07
Post-PCL	51.1 (16.1)	48.1 (16.2)	.01	48.7 (15.8)	51.0 (16.1)	.08

Note. MST = military sexual trauma. PCL = Posttraumatic Stress Disorder Checklist.

completers ($p = .01$). The decrease in PTSD symptoms following CPT treatment in women who experienced MST was 3.17 points greater than in men who experienced MST (95% CI, 0.74–5.61).

A similar pattern was found within the cohort of veterans negative for MST. In the MST-negative cohort, there was a significant effect of time for both treatments, with PCL scores reducing on average by 8.23 points after CPT ($p < .001$, [95% CI, 7.89–8.57]) and 11.25 points after PE ($p < .001$, [95% CI, 10.60–11.90]). The only other significant effect for either treatment was the gender by time interaction within CPT completers ($p < .001$). The decrease in PTSD symptoms following CPT treatment in women without a history of MST was 2.48 points greater than in men without a history of MST (95% CI, 1.09–3.87).

4. Discussion

The current study examined the influence of gender and MST on evidence-based psychotherapy (EBP) outcomes for post 9/11 veterans with PTSD. Most EBP for PTSD clinical trials have not been adequately powered to compare these subgroups and it remains unclear how outcomes from controlled trials may generalize to real world clinical settings. The current findings suggest PTSD symptoms in veterans with and without MST decrease after receiving CPT and PE delivered across VHA clinics, regardless of gender. However, we did find gender differences in PTSD outcomes for veterans, with women demonstrating greater gains than men after an adequate dose of CPT, but no difference in outcomes after an adequate dose of PE.

Our finding that veterans who experienced MST did not demonstrate poorer outcomes compared to those who had not experienced MST in either treatment is consistent with the previous study examining this effect for CPT in a residential program (Voelkel et al., 2015) as well as a prior outpatient (Eftekhari et al., 2013) and a clinical trial of PE (Schnurr et al., 2007). There was partial support of our hypothesis that women veterans versus men would demonstrate significantly greater reductions in PTSD symptoms. Women veterans who completed CPT demonstrated greater decreases in PTSD symptoms compared to men, although the gender differences were modest; furthermore, men and women derived similar benefit from PE, regardless of MST history. This finding is consistent with results from the two previous studies in residential settings (Tiet et al., 2015; Voelkel et al., 2015) and suggests that despite being associated with numerous negative consequences, men and women who experienced MST benefit similarly from CPT and PE compared to those without a history of MST. Sensitivity analyses confirmed that in fact, within both MST-positive and MST-negative completer cohorts, there was a similar pattern of women demonstrating greater decreases in PTSD symptoms than men in CPT, but not

Table 3
Mixed-effects linear regressions examining 2-way interactions of gender and MST effects on CPT and PE effectiveness.

	CPT		PE	
	Coefficient (95%CI)	p	Coefficient (95% CI)	p
Baseline age (years)	0.04 (0.02–0.06)	<0.001*	0.05 (0.02–0.09)	0.003*
Post-PCL (vs. pre)	–8.22 (–8.56 to –7.88)	<0.001*	–11.26 (–11.90 to –10.61)	<0.001*
Female	–0.25 (–1.11 to 0.60)	0.558	–0.19 (–2.05 to 1.67)	0.839
Female X post-PCL	–2.67 (–3.86 to –1.48)	<0.001*	–2.15 (–4.77 to 0.46)	0.107
MST	0.07 (–0.87 to 1.02)	0.887	–0.40 (–2.41 to 1.60)	0.692
MST X post-PCL	0.21 (–1.12 to 1.02)	0.754	1.06 (–1.77 to 3.90)	0.461
Race				
White	Referent		Referent	
Black	1.44 (1.00–1.88)	<0.001*	0.60 (–0.24 to 1.44)	0.162
American Indian/Alaska native	1.08 (–0.30 to 2.46)	0.124	1.22 (–1.78 to 4.22)	0.425
Asian	1.23 (0.08–2.37)	0.036	–0.55 (–2.54 to 1.45)	0.592
Native Hawaiian/Pacific Islander	1.42 (0.03–2.81)	0.046	–3.09 (–6.15 to –0.02)	0.049
Multi-race	1.71 (0.30–3.11)	0.017	0.30 (–2.26 to 2.86)	0.819
Missing	–0.03 (–0.80 to 0.74)	0.943	2.24 (0.93–3.54)	0.001
Ethnicity				
Hispanic/Latinx	Referent			
Not Hispanic/Latinx	–0.50 (–1.00 to –0.01)	0.047	–	–
Other	–0.43 (–1.50 to 0.64)	0.431	–	–
Missing	–0.02 (–1.47 to 1.43)	0.981	–	–
Marital Status				
Married	Referent			
Never married	–0.05 (–0.47 to 0.36)	0.796	–	–
Divorced or single	0.49 (0.09–0.90)	0.017	–	–
Widowed	1.93 (–1.51 to 5.37)	0.271	–	–
Missing	–1.90 (–3.32 to –0.48)	0.009	–	–
Service branch				
Air force	Referent			
Army	0.94 (0.27–1.60)	0.006*	–	–
Marine	0.47 (–0.30 to 1.24)	0.231	–	–
Navy	0.22 (–0.64 to 1.08)	0.617	–	–
Component				
Active duty	Referent			
Guard	–0.03 (–0.46 to 0.39)	0.874	–	–
Reserve	–0.38 (–0.88 to 0.11)	0.131	–	–
Rank				
Enlisted	Referent		Referent	
Officer	–0.53 (–1.30 to 0.23)	0.171	–0.58 (–2.08 to 0.92)	0.451
Warrant	1.27 (–0.77 to 3.32)	0.223	0.74 (–4.35 to 5.82)	0.777
Service connected	2.63 (1.62–3.65)	<0.001*	2.35 (0.16–4.55)	0.035
Baseline PCL-4	0.81 (0.80–0.83)	<0.001*	0.81 (0.78–0.84)	<0.001*
Times Deployed				
Single	Referent		Referent	
Multiple	–	–	–	0.007*

Table 3 (continued)

	CPT		PE	
	Coefficient (95%CI)	p	Coefficient (95% CI)	p
Missing	–	–	–0.84 (–1.46 to –0.23)	
			–0.19 (–6.62 to 6.25)	0.955

Note. **p* < .01. Education was excluded due to collinearity. CPT = Cognitive Processing Therapy. PE = Prolonged Exposure.

PE. The influence of gender, regardless of MST history, therefore may play an important role in treatment outcomes. Notably, although PCL scores decreased significantly following CPT and PE completion, PTSD symptoms remained above clinical cut-offs for PTSD. This finding is in line with recent research demonstrating variability in EBP for PTSD effectiveness in veterans (Maguen et al., 2020; Steenkamp et al., 2015) and suggests continued research on improving outcomes is needed.

In contextualizing the current findings, the literature on gender differences in PTSD treatment outcomes is mixed (see Blain et al., 2010 for review), likely at least partially due to variances in population, study design, trauma type, and level of care. In civilians, some studies found that men demonstrate smaller reductions in PTSD symptoms from trauma-focused therapies (e.g., PE, CPT) than women (Karatzias et al., 2007; Tarrrier et al., 2000; Watts et al., 2013), while others report no gender differences following CPT and PE (e.g., Galovski et al., 2013; Marks et al., 1998). In veterans, research on gender differences in outcomes is also mixed although there have been significantly fewer studies. In a veteran sample and in line with the present findings, Mouilso et al. (2015) also found no gender differences in PE effectiveness for PTSD symptoms in a VHA outpatient clinic. However, Eftekhari et al. (2013) found even when controlling for initial symptom severity and trauma type, women veterans demonstrated greater reductions in PTSD symptoms from PE than men. Our CPT-only finding is in line with the one prior study that examined gender differences in CPT residential treatment (Voelkel et al., 2015).

One possible explanation for smaller reductions for men is related to the intersection of socialized gender norms and emotion regulation (see review Berke et al., 2018). Values associated with masculinity in Western culture include concepts such as strength, power, dominance, self-reliance, and emotional toughness (e.g., Jackupcak et al., 2006). From early ages, boys have fewer opportunities to practice labeling and expressing emotions and receive minimizing responses from caregivers for expressing emotions such as sadness and fear (Berke et al., 2018). The perpetual restriction of emotions is thought to further perpetuate deficits in the ability to identify and describe emotions (Levant, 1998; Levant et al., 2006, 2009). Difficulty identifying and labeling is associated with numerous negative outcomes (Gaher et al., 2014; Sullivan et al., 2015) including persistence of PTSD symptoms in male veterans (Morris et al., 2014; O'Brien et al., 2008).

Although it is not initially clear why men had poorer outcomes only in the CPT cohort, it is possible that these differences are related to the different cognitive-behavioral techniques employed by these EBPs. CPT involves repeatedly identifying unhelpful cognitions and their accompanying emotions through worksheets and Socratic questioning. These empirically supported techniques require awareness and labeling of feelings, thoughts, and sensations (Smidt and Suvak, 2015) in a much more detailed way than PE. Thus, CPT may be particularly challenging for men because the treatment explicitly necessitates skills (i.e., difficulty identifying feelings) that are in contrast to socialized masculinity (O'Brien et al., 2008). For this same reason, women veterans who are socialized early on to develop these skills may be better equipped to benefit from CPT (see Street and Dardis, 2018). Perceptions of exposure therapy as action-oriented and even, more intense may align with gender norms reinforced by military culture (Brooks, 2005), and male

Table 4
Mixed-effects linear regressions examining 3-way interactions of gender and MST effects on CPT and PE effectiveness.

	CPT		PE	
	Coefficient (95%CI)	p	Coefficient (95% CI)	p
Baseline age (years)	0.04 (0.02–0.06)	<0.001*	0.05 (0.02–0.09)	0.003*
Post-PCL (vs. pre)	–8.23 (–8.57 to –7.89)	<0.001*	–11.25 (–11.90 to –10.60)	<0.001*
Female	–0.14 (–1.14 to 0.86)	0.788	–0.01 (–2.24 to 2.23)	0.995
MST	0.30 (–1.11 to 1.72)	0.673	–0.11 (–2.92 to 2.70)	0.938
Female x MST	–0.42 (–2.33 to 1.48)	0.661	–0.60 (–4.61 to 3.42)	0.770
Female x post-PCL	–2.48 (–3.88 to –1.08)	0.001*	–2.28 (–5.42 to 0.86)	0.155
MST x Post-PCL	0.59 (–1.40 to 2.59)	0.558	0.86 (–3.11 to 4.83)	0.671
Female x MST x post-PCL	–0.69 (–3.38 to 1.99)	0.612	0.41 (–5.25 to 6.08)	0.886
Race				
White	Referent		Referent	
Black	1.43 (0.99–1.88)	<0.001*	0.60 (–0.25 to 1.44)	0.165
American Indian/ Alaska native	1.07 (–0.30 to 2.45)	0.127	1.23 (–1.77 to 4.23)	0.422
Asian	1.22 (0.07–2.36)	0.037	–0.55 (–2.54 to 1.45)	0.591
Native Hawaiian/ Pacific Islander	1.43 (0.03–2.82)	0.044	–3.08 (–6.15 to –0.01)	0.049
Multi-race	1.69 (0.29–3.10)	0.018	0.30 (–2.27 to 2.86)	0.821
Missing	–0.03 (–0.80 to 0.75)	0.946	2.24 (0.93–3.54)	0.001
Ethnicity				
Hispanic/Latinx	Referent			
Not Hispanic/ Latinx	–0.51 (–1.00 to –0.01)	0.047	–	–
Other	–0.43 (–1.50 to 0.64)	0.430	–	–
Missing	–0.01 (–1.46 to 1.44)	0.988	–	–
Marital Status				
Married	Referent			
Never married	–0.06 (–0.48 to 0.35)	0.761	–	–
Divorced or single	0.49 (0.09–0.90)	0.017	–	–
Widowed	1.94 (–1.49 to 5.38)	0.268	–	–
Missing	–1.92 (–3.34 to –0.50)	0.008	–	–
Service branch				
Air force	Referent			
Army	0.93 (0.27–1.59)	0.006*	–	–
Marine	0.47 (–0.30 to 1.24)	0.233	–	–
Navy	0.20 (–0.66 to 1.06)	0.650	–	–
Component				
Active duty	Referent			
Guard	–0.03 (–0.45 to 0.40)	0.897	–	–
Reserve	–0.38 (–0.88 to 0.11)	0.130	–	–
Rank				
Enlisted	Referent		Referent	
Officer	–0.54 (–1.31 to 0.23)	0.166	–0.58 (–2.08 to 0.93)	0.453
Warrant	1.28 (–0.76 to 3.33)	0.219	0.72 (–4.37 to 5.81)	0.782
Service connected	2.64 (1.62–3.65)	<0.001*	2.34 (0.15–4.54)	0.036
Baseline PCL-4		<0.001*	0.81 (0.78–0.84)	<0.001*

Table 4 (continued)

	CPT		PE	
	Coefficient (95%CI)	p	Coefficient (95% CI)	p
	0.81 (0.80–0.83)			
Times Deployed				
Single	Referent		Referent	
Multiple	–	–	–0.84 (–1.46 to –0.23)	0.007*
Missing	–	–	–0.19 (–6.63 to 6.24)	0.953

Note. *p < .01. Education was excluded due to collinearity. CPT = Cognitive Processing Therapy. PE = Prolonged Exposure. PCL = Posttraumatic Stress Disorder Checklist.

veterans may thus feel more comfortable with PE. Future studies are needed to determine the drivers of these gender differences and develop strategies to improve outcomes for men, particularly before CPT.

Strengths of the current study include the use of a large sample size, well powered for subgroup analyses, ITT analyses that reflected similar findings, and strong ecological validity with patients spanning across several geographical U.S. areas in real world clinics. The current findings thus further our knowledge of the effectiveness of evidence-based PTSD treatments in actual VHA clinical practice. Despite these strengths, several important limitations should be reviewed. First and most importantly, it is unknown whether MST was the index trauma (MST-IT) that was addressed within treatment, or whether patients' MST was related to sexual harassment, assault, or both. Therefore, it is impossible to determine whether the current findings generalize to treatment effectiveness for MST-related PTSD specifically. Future directions include examining PE and CPT effectiveness and efficacy in both outpatient clinical settings and rigorous, large clinical trials for veterans with MST-IT, oversampling for men in order to adequately assess the influence of gender. The current study also did not compare effectiveness between CPT and PE, limiting our ability to determine whether one treatment may be more beneficial for veterans than the other.

Additionally, the current study utilized retrospective chart review, limiting our ability to rigorously compare effectiveness differences by gender and MST, assess treatment fidelity issues, or control for the impact of potential other treatments. Furthermore, as this was an observational study, PCLs were administered in varying intervals before and after treatment, which limited our ability to capture the exact change in PTSD symptoms. PCL data were not available for all participants and therefore the effectiveness of all who completed EBPs for PTSD could not be determined and although the NLP algorithm used demonstrated strong performance metrics, cases may have been missed and therefore unintentionally excluded. Finally, the current sample was comprised of only VHA users, therefore limiting the generalizability to the broader veteran population.

5. Conclusions

In summary, our findings demonstrate that CPT and PE are effective in reducing PTSD symptoms in post 9/11 veterans across VHA outpatient clinics. In line with prior research examining gender differences, women veterans demonstrated greater reductions in PTSD symptomology than men, although gender differences were modest. However, this finding was only true for those who completed CPT, but not PE. Contrary to hypotheses, experience of MST did not impact the effectiveness of either treatment regardless of gender, suggesting CPT and PE may be effective for veterans with and without MST. Although future research is needed to more rigorously examine these differences, these findings are promising, and it is our hope that the current results encourage VHA clinician to employ these EBPs in veterans who experienced MST.

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CRedit authorship contribution statement

A.J. Khan: Conceptualization, Formal analysis, Writing - original draft. **N. Holder:** Formal analysis, Writing - review & editing. **Y. Li:** Formal analysis. **B. Shiner:** Methodology, Investigation, Writing - review & editing. **E. Madden:** Writing - review & editing. **K. Seal:** Writing - review & editing. **T.C. Neylan:** Writing - review & editing. **S. Maguen:** Methodology, Investigation, Funding acquisition, Supervision, Writing - review & editing.

Declaration of competing interest

The authors declare no conflicts of interest.

References

- Berke, D.S., Reidy, D., Zeichner, A., 2018. Masculinity, emotion regulation, and psychopathology: a critical review and integrated model. *Clin. Psychol. Rev.* 66, 106–116.
- Blain, L.M., Galovski, T.E., Robinson, T., 2010. Gender differences in recovery from posttraumatic stress disorder: a critical review. *Aggress. Violent Behav.* 15, 463e474.
- Blanchard, E.B., Jones Alexander, J., Buckley, T.C., Forneris, C.A., 1996. Psychometric properties of the PTSD checklist (PCL). *Behav. Res. Ther.* 34, 669–673.
- Blevins, C.A., Weathers, F.W., Davis, M.T., Witte, T.K., Domino, J.L., 2015. The posttraumatic stress disorder checklist for DSM-5 (PCL-5): development and initial psychometric evaluation. *J. Trauma Stress* 28, 489–498.
- Bovin, M.J., Marx, B.P., Weathers, F.W., Gallagher, M.W., Rodriguez, P., Schnurr, P.P., Keane, T.M., 2015. Psychometric properties of the PTSD checklist for diagnostic and statistical manual of mental disorders-fifth edition (PCL-5) in veterans. *Psychol. Assess.* 28, 1379–1391.
- Brooks, G.R., 2005. Counseling and psychotherapy for male military veterans. In: Good, G.E., Brooks, G.R. (Eds.), *The New Handbook of Psychotherapy and Counseling with Men: A Comprehensive Guide to Settings, Problems, and Treatment Approaches*. Jossey-Bass, San Francisco, pp. 104–118.
- Department of Veterans Affairs, 2004. *Military sexual trauma (Independent study course)*. Retrieved from http://www1.va.gov/vhi/docs/MST_www.pdf.
- Eftekhari, A., Ruzek, J.I., Crowley, J.J., Rosen, C.S., Greenbaum, M.A., Karlin, B.E., 2013. Effectiveness of national implementation of prolonged exposure therapy in Veterans Affairs care. *JAMA Psychiatr.* 70 (9), 949–955. <https://doi.org/10.1001/jamapsychiatry.2013.36>.
- Fihn, S.D., Francis, J., Clancy, C., Nelson, C., Nelson, K., Rumsfeld, J., Bates, J., Graham, G.L., 2014. Insights from advanced analytics at the veterans health administration. *Health Aff.* 33 (7), 1203–1211.
- Foa, E.B., McLean, C.P., Zang, Y., Rosenfield, D., Yadin, E., Yarvis, J.S., et al., 2018. Effects of prolonged exposure therapy delivered over 2 weeks vs 8 weeks vs present-centered therapy on PTSD symptom severity in military personnel: a randomized clinical trial. *J. Am. Med. Assoc.* 319 (4), 354–364.
- Frankfurt, S.B., DeBeer, B.B., Morissette, S.B., Kimbrel, N.A., La Bash, H., Meyer, E., 2018. Mechanisms of moral injury following military sexual trauma and combat in post-9/11 U.S. war veterans. *Front. Psychiatr.* 9, 520.
- Fulton, J.J., Calhoun, P.S., Wagner, H.R., Schry, A.R., Hair, L.P., Feeling, N., Elbogen, E., Beckman, J.C., 2015. The prevalence of posttraumatic stress disorder in Operation Enduring Freedom/Operation Iraqi Freedom (OEF/OIF) veterans: a meta-analysis. *J. Anxiety Disord.* 31, 98–107.
- Gaher, R.M., O'Brien, C., Smiley, P., Hahn, A.M., 2014. Alexithymia, coping styles, and traumatic stress symptoms in a sample of veterans who experienced military sexual trauma. *Stress Health* 32 (1), 55–62.
- Galovski, T.E., Blain, L.M., Chappuis, C., Fletcher, T., 2013. Sex differences in recovery from PTSD in male and female interpersonal assault survivors. *Behav. Res. Ther.* 51 (6), 247–255.
- Haagen, J.F.G., Smid, G.E., Knipscheer, J.W., Kleber, R.J., 2015. The efficacy of recommended treatments for veterans with PTSD: a metaregression analysis. *Clin. Psychol. Rev.* 40, 184–194.
- Hedeker, D., Gibbons, R.D., 2006. *Longitudinal Data Analysis*. John Wiley & Sons, Hoboken, NJ.
- Himmelfarb, N., Yaeger, D., Mintz, J., 2006. Posttraumatic stress disorder in female veterans with military and civilian sexual trauma. *J. Trauma Stress* 19, 837–846.
- Holder, N., Shiner, B., Li, Y., Madden, E., Neylan, T. C., Seal, K. H., Lujan, C., Patterson, O. V., DuVall, S. L., & Maguen, S., (in press). Cognitive processing therapy for veterans with posttraumatic stress disorder: what is the median effective dose? *J. Affect. Disord.*
- Holliday, R., Smith, N.B., Holder, N., Gross, G.M., Monteith, L.L., Maguen, S., Hoff, R.A., Rotem-Harpaz, I., 2020. Comparing the effectiveness of VA residential PTSD treatment for veterans who do and do not report a history of MST: a national investigation. *J. Psychiatr. Res.* 122, 42–47.
- Hoyt, T., Klosterman, R.J., Williams, L.F., 2011. Military sexual trauma in men: a review of reported rates. *J. Trauma & Dissociation* 12, 244–260.
- Jakupcak, M., Osborne, T.L., Michael, S., Cook, J.W., McFall, M., 2006. Implications of masculine gender role stress in male veterans with posttraumatic stress disorder. *Psychol. Men Masc.* 7 (4), 203–211.
- Jordan, A.H., Esisen, E., Bolton, E., Nash, W.P., Litz, B.T., 2017. Distinguishing war-related PTSD resulting from perpetration- and betrayal-based morally injurious events. *Psychol. Trauma: Theor. Res. Pract. Pol.* 9 (6), 627–634.
- Kang, H.K., Hyams, K.C., 2005. Mental health care needs among recent war Veterans. *N. Engl. J. Med.* 352, 1289.
- Karatzias, A., Power, K., McGoldrick, T., Brown, K., Buchanan, R., Sharp, D., Swanson, V., 2007. Predicting treatment outcome on three measures of post-traumatic stress disorder. *Eur. Arch. Psychiatr. Clin. Neurosci.* 257 (1), 40–46.
- Karlin, B.E., Ruzek, J.I., Chard, K.M., Eftekhari, A., Monson, C.M., Hembree, E., Resick, P.A., et al., 2010. Dissemination of evidence-based psychological treatments for posttraumatic stress disorder in the Veterans Health Administration. *J. Trauma Stress* 23 (6), 663–673.
- Kimerling, R., Gima, K., Smith, M.W., Street, A., Frayne, S., 2007. The Veterans Health Administration and military sexual trauma. *Am. J. Publ. Health* 97 (12), 2160–2166.
- Leskela, J., Dieperink, M., Kolk, C., 2001. Group treatment with sexually assaulted male veterans: A year in review. *Group* 25 (4), 303–319.
- Levant, R., 1998. Desperately seeking language: understanding, assessing, and treating normative male alexithymia. In: Pollack, W., Levant, R. (Eds.), *New Psychotherapy for Men*. Wiley, New York, pp. 35–56.
- Levant, R.F., Good, G.E., Cook, S.W., O'Neil, J.M., Smalley, K.B., Owen, K., Richmond, K., 2006. The normative male alexithymia scale: measurement of a gender-linked syndrome. *Psychol. Men Masc.* 7, 212–224.
- Levant, R.F., Hall, R.J., Williams, C.M., Hasan, N.T., 2009. Gender differences in alexithymia. *Psychol. Men Masc.* 10, 190–203.
- Lofgreen, A.M., Tirone, V., Carroll, K.K., Rufa, A.K., Smith, D.L., Bagley, J., et al., 2020. Improving outcomes for a 3-week intensive treatment program for posttraumatic stress disorder in survivors of military sexual trauma. *J. Affect. Disord.* 269, 134–140.
- Maguen, S., Holder, N., Li, Y., Madden, E., Neylan, T.C., Seal, K.H., et al., 2020. Factors associated with PTSD symptom improvement among Iraq and Afghanistan veterans receiving evidence-based psychotherapy. *J. Affect. Disord.* 273, 1–7.
- Maguen, S., Madden, E., Patterson, O.V., DuVall, S.L., Goldstein, L.A., Burkman, K., Shiner, B., 2018. Measuring use of evidence based psychotherapy for Posttraumatic Stress Disorder in a large national healthcare system. *Adm. Pol. Ment. Health* 45 (4), 519–529.
- Marks, I., Lovell, K., Noshirvani, H., Livanou, M., Thrasher, S., 1998. Treatment of posttraumatic stress disorder by exposure and/or cognitive restructuring: a controlled study. *Arch. Gen. Psychiatr.* 55 (4), 317–325.
- McIntyre, L., Butterfield, M., Nanda, K., Parsey, K., Stechuchak, K., McChesney, A., Koops, C., Bastian, L., 1999. Validation of a trauma questionnaire in veteran women. *Journal of the Society of General Internal Medicine* 14 (3), 186–189.
- Monson, C.M., Schnurr, P.P., Resick, P.A., Friedman, M.J., Young-Xu, Y., Stevens, S.P., 2006. Cognitive processing therapy for veterans with military-related posttraumatic stress disorder. *J. Consult. Clin. Psychol.* 74 (5), 898–907.
- Monteith, L.L., Bahraini, N.H., Matarazzo, B.B., Soberay, K.A., Smith, C., 2016. Perceptions of institutional betrayal predict suicidal self-directed violence among veterans exposed to military sexual trauma. *J. Clin. Psychol.* 72 (7), 743–755.
- Morris, E., Smith, J., Farooqui, S., Suris, A., 2014. Unseen battles: the recognition, assessment, and treatment issues of men with military sexual trauma (MST). *Trauma Violence Abuse* 15 (2), 94–101.
- Mouilto, E.R., Tuerk, P.W., Schnurr, P.P., Rauch, S.A.M., 2015. Addressing the gender gap: prolonged Exposure for PTSD in veterans. *Psychol. Serv.* 13 (3), 308–316.
- Mullen, K., Holliday, R., Morris, E., Raja, A., Suris, A., 2014. Cognitive processing therapy for male veterans with military sexual trauma-related posttraumatic stress disorder. *J. Anxiety Disord.* 28 (8), 761–764.
- Norris, F.H., Hamblen, J.L., 2003. Standardized self-report measures of civilian trauma and PTSD. In: Wilson, J., Keane, T. (Eds.), *Assessing Psychological Trauma and PTSD: A Practitioner's Handbook*, 2nd Ed. Guilford, New York.
- O'Brien, C., Gaher, R.M., Pope, C., Smiley, P., 2008. Difficulty identifying feelings predicts the persistence of trauma symptoms in a sample of veterans who experienced military sexual trauma. *J. Nerv. Ment. Dis.* 196 (3), 252–255.
- Parnell, D., Ram, V., Cazares, P., Webb-Murphy, J., Roberson, M., Ghaed, S., 2018. Sexual assault and disabling PTSD in active duty service women. *Mil. Med.* 183 (9–10), e481–e488.
- SAS Institute, 2013. *The SAS System for Windows (Release, 9.4)*. Author, Cary, NC.
- Schnurr, P.P., Friedman, M.J., Engel, C.C., Foa, E.B., Shea, M.T., Chow, B.K., et al., 2007. Cognitive behavioral therapy for posttraumatic stress disorder in women: a randomized controlled trial. *J. Am. Med. Assoc.* 297 (8), 820–830. <https://doi.org/10.1001/jama.297.8.820>.

- Sexton, M.B., Raggio, G.A., McSweeney, L.B., Authier, C.C., Rauch, S.A.M., 2017. Contrasting gender and combat versus military sexual traumas: psychiatric symptom severity and morbidities in treatment-seeking veterans. *J. Wom. Health* 26 (9), 933–940.
- Shiner, B., Gui, J., Leonard Westgate, C., Schnurr, P.P., Watts, B.V., Cornelius, S.L., Maguen, S., 2019. Using patient-reported outcomes to understand the effectiveness of guideline-concordant care for post-traumatic stress disorder in clinical practice. *J. Eval. Clin. Pract.* 25 (4), 689–699.
- Smidt, K., Suvak, M., 2015. A brief, but nuanced, review of emotional granularity and emotion differentiation research. *Curr. Opin. Psychol.* 3, 48–51.
- Sripada, R.K., Blow, F.C., Rauch, S.A.M., Ganoczy, D., Hoff, R., Harpaz-Rotem, I., Bohnert, K.M., 2019. Examining the nonresponse phenomenon: factors associated with treatment response in a national sample of veterans undergoing residential PTSD treatment. *J. Anxiety Disord.* 63, 18–25.
- StataCorp, 2017. *Stata Statistical Software: Release 15*. StataCorp LP, College Station, TX.
- Steenkamp, M.M., Litz, B.T., Hoge, C.W., Marmar, C.R., 2015. Psychotherapy for military-related PTSD: a review of randomized clinical trials. *J. Am. Med. Assoc.* 314 (5), 489–500.
- Stirman, S.W., DeRubeis, R.J., Crits-Christoph, P., Rothman, A., 2005. Can the randomized controlled trial literature generalize to nonrandomized patients? *J. Consult. Clin. Psychol.* 73 (1), 127–135.
- Straud, C., Siev, J., Messer, S., Zalta, A., 2019. Examining military population and trauma type as moderators of treatment outcome for first-line psychotherapies for PTSD: A meta-analysis. *Journal of Anxiety Disorders* 67, 102133.
- Street, A., Dardis, C., 2018. Using a social construction of gender lens to understand gender differences in posttraumatic stress disorder. *Clinical Psychology Review* 66, 97–105.
- Sullivan, L., Camic, P.M., Brown, S.L., 2015. Masculinity, alexithymia, and fear of intimacy as predictors of UK men's attitudes towards seeking professional psychological help. *Br. J. Health Psychol.* 20 (1), 194–211.
- Surís, A., Lind, L., Kashner, M., Borman, P., Petty, F., 2007. Mental health, quality of life, and health functioning in women veterans: differential outcomes associated with military and civilian sexual assault. *J. Interpers Violence* 22 (2), 179–197.
- Surís, A., Lind, L., Kashner, M., Borman, P., Petty, F., 2004. Sexual assault in women veterans: an examination of PTSD risk, health care utilization, and cost of care. *Psychosom. Med.* 66, 749–756.
- Surís, A., Link-Malcom, J., Chard, K., Ahn, C., North, C., 2013. A randomized clinical trial of cognitive processing therapy for veterans with PTSD related to military sexual trauma. *J. Trauma Stress* 26 (1), 28–37. <https://doi-org.ezproxysuf.flo.org/10.1002/jts.21765>.
- Tarrier, N., Sommerfield, C., Pilgrim, H., Faragher, B., 2000. Factors associated with outcome of cognitive-behavioural treatment of chronic post-traumatic stress disorder. *Behav. Res. Ther.* 38, 191–202.
- Tiet, Q.Q., Leyva, Y.E., Blau, K., Turchik, J.A., Rosen, C.S., 2015. Military sexual assault, gender, and PTSD treatment outcomes of U.S. veterans. *J. Trauma Stress* 28, 92–101.
- Turchik, J.A., McLean, C., Rafie, S., Hoyt, T., Rosen, C.S., Kimerling, R., 2012. Perceived barriers to care and provider gender preferences among veteran men who have experienced military sexual trauma: a qualitative analysis. *Psychol. Serv.* 10 (2), 213–222.
- U.S. Department of Veterans Affairs, Department of Defense, 2010. *VA/DoD Clinical Practice Guideline for the Management of Post-traumatic Stress and Acute Stress Disorder*, third ed. (Washington, D.C.).
- Voelkel, E., Pukay-Martin, N.D., Walter, K.H., Chard, K.M., 2015. Effectiveness of cognitive processing therapy for male and female U.S. veterans with and without military sexual trauma. *J. Trauma Stress* 1–9, 00.
- Walter, K.H., Buckley, A., Simpson, J.M., Chard, K.M., 2014a. Residential PTSD treatment for female veterans with military sexual trauma: does a history of childhood sexual abuse influence outcome? *J. Interpers Violence* 29 (6), 971–986. <https://doi.org/10.1177/0886260513506055>.
- Walter, K.H., Varkovitzky, R.L., Owens, G.P., Lewis, J., Chard, K.M., 2014b. Cognitive processing therapy for veterans with posttraumatic stress disorder: a comparison between outpatient and residential treatment. *J. Consult. Clin. Psychol.* 82 (4), 551–561.
- Watts, B.V., Schnurr, P.P., Mayo, L., Young-Xu, Y., Weeks, W.B., Friedman, M.J., 2013. Meta-analysis of the efficacy of treatments for posttraumatic stress disorder. *J. Clin. Psychiatr.* 74, e541–e550.
- Weathers, F.W., Litz, B.T., Herman, D.S., Huska, J.A., Keane, T.M., 1993. The PTSD Checklist (PCL): reliability, validity, and diagnostic utility. In: Paper Presented at the 9th Annual Conference of the ISTSS (San Antonio, TX).
- Wilson, L.C., 2016. The prevalence of military sexual trauma: a meta-analysis. *Trauma Violence Abuse* 19 (5), 584–597.
- Wortmann, J.H., Jordan, A.H., Weathers, F.W., Resick, P.A., Dondanville, K.A., Hall-Clark, B., et al., 2016. Psychometric analysis of the PTSD Checklist-5 (PCL-5) among treatment-seeking military service members. *Psychol. Assess.* 28, 1392–1403.
- Yeager, D., Magruder, K.M., Knapp, R.G., Nicholas, J.S., Frueh, B.C., 2007. Performance characteristics of the posttraumatic stress disorder checklist and SPAN in Veterans Affairs primary care settings. *Gen. Hosp. Psychiatr.* 29 (4), 294–301.
- Zalta, A.K., Held, P., Smith, D., Klassen, B.J., Lofgreen, A.M., Norman, P.S., et al., 2018. Evaluating patterns and predictors of symptom change during a three-week intensive outpatient treatment for veterans with PTSD. *BMC Psychiatr.* 18 (1), 242.
- Zappert, L.N., Westrup, D., 2008. Cognitive processing therapy for posttraumatic stress disorder in a residential treatment setting. *Psychother. Theor. Res. Pract. Train.* 45, 361–376.